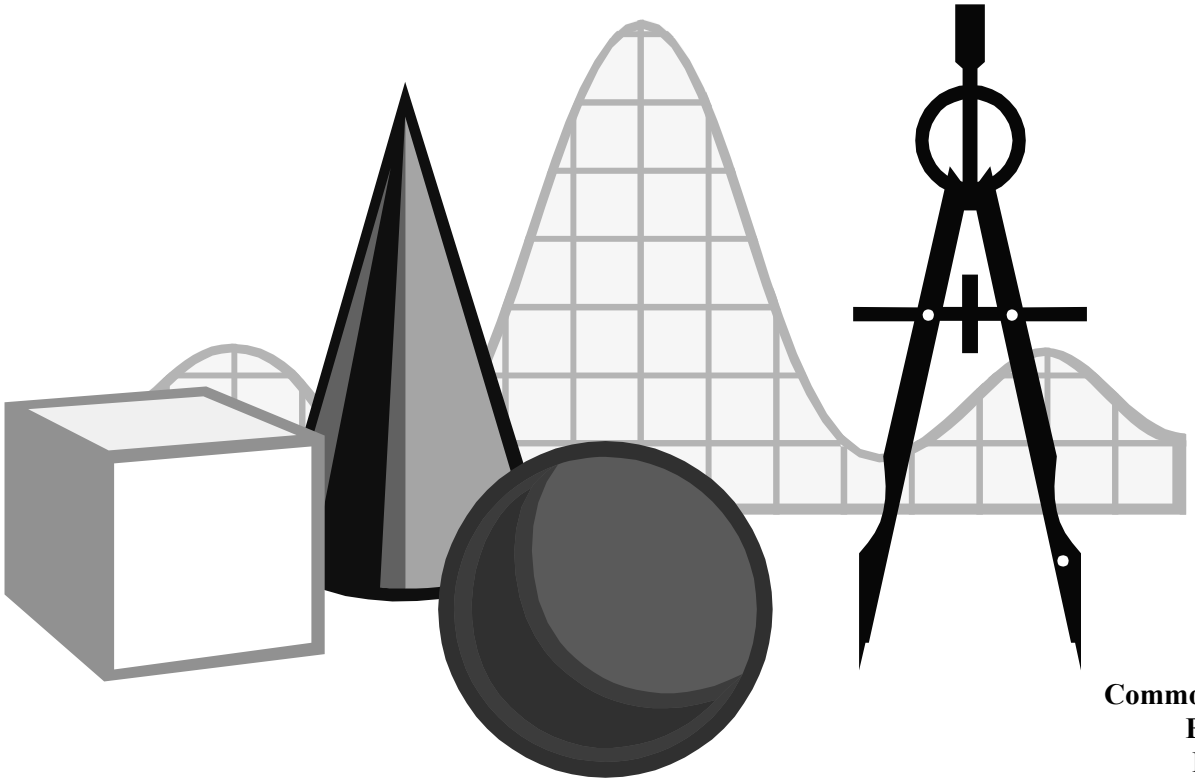
MATHEMATICS STANDARDS OF LEARNING
SAMPLE SCOPE AND SEQUENCE

Grade 4



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Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

by the

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The *Mathematics Standards of Learning Sample Scope and Sequence* and the *Mathematics Standards of Learning Curriculum Framework* can be found in a PDF and Word file format on the Virginia Department of Education's Web site at http://www.pen.k12.va.us.

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Preface

As an additional resource to help school divisions develop curricula aligned to the 2001 Mathematics Standards of Learning, the Virginia Department of Education has developed sample scope and sequence documents in kindergarten through grade eight and in core high school courses. These sample documents provide guidance on how the essential knowledge and skills that are identified in the Standards of Learning and the Standards of Learning Curriculum Framework may be introduced to students in a logical, sequential, and meaningful manner.

These sample scope and sequence documents are intended to serve as general guides to help teachers and curriculum developers align their curricula and instruction to support the Standards of Learning. Each sample document is organized around specific topics to help teachers present information in an organized, articulated manner. Also included are correlations to the Standards of Learning for that curricular area for a particular grade level or course, as well as ideas for classroom assessments and teaching resources.

The sample scope and sequence documents are not intended to prescribe how curriculum should be developed or how instruction should be delivered. Instead, they provide examples showing how teachers and school divisions might present to students in a logical and effective manner information that has been aligned with the Standards of Learning. School divisions that need assistance in developing curricula aligned with the Standards of Learning are encouraged to consider the sample scope and sequence guides. Teachers who use the documents should correlate the content identified in the guides with available instructional resources and develop lesson plans to support instruction.

Copies of the sample scope and sequence guides are available at http://www.pen.k12.va.us in both PDF and Microsoft Word formats.

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Introduction

The elementary school sample mathematics scope and sequence is based on the essential knowledge and skills identified in the Mathematics Standards of Learning Curriculum Framework. The sample scope and sequence is indexed by organizing topics reflective of the big ideas contained within the grade level curriculum and correlated to the Mathematics Standards of Learning. It is not intended to be a complete list of all the lessons that need to be taught and mastered during each elementary school grade, yet it sets forth a comprehensive set of instructional expectations that students should master to successfully achieve the grade level standards.

A primary purpose of this document is to offer teachers and curriculum developers one way to sequence and focus their curricula. Teachers may restructure the organizing topics into an instructional program that is inclusive, but better aligned with the available instructional resources (e.g., textbooks, supplemental resource materials, and technological support materials). Once the instructional materials for a scope and sequence are identified, teachers should give consideration to an alignment of the instructional time for each of the topics contained within an assessment reporting category or to the weight of the reporting category.

Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well. The resources section included in the sample scope and sequence document provides a list of manipulatives that may be used in the instructional lessons for the development of the concepts related to the content standards. It also includes page references to the Mathematics Curriculum Framework where instructional strategies and further information can be found for teaching the particular concepts and skills. Additionally, within the resource area, staff development resource documents produced by the Department of Education are listed and can be found on the Department of Education's Web site at www.pen.k12.va.us.

Assessments should support the learning of important mathematics and provide useful feedback to both teachers and students. The classroom assessment methods section in this sample scope and sequence lists a few types of the tests, tasks, and observations that should be used in assessing the student's progress. When teachers select assessment methods, they should ensure that all students have the opportunity to clearly and completely demonstrate what they know and are able to do. Whether the focus is on formative assessment aimed at guiding instruction, or on summative assessment of the student's knowledge, it is important that the teacher have a strong understanding of the mathematics being assessed and the skills to make valid inferences about a student's knowledge and understanding.

The content of the Mathematics Standards of Learning supports five goals for students: becoming mathematical problem solvers, communicating mathematically, reasoning mathematically, making mathematical connections, and representing mathematical ideas. These goals provide a framework for students to learn with understanding, actively building new knowledge from experience and prior knowledge. Therefore, throughout the study of mathematics, students should be encouraged to talk about mathematics, to use the language and symbols of mathematics, to discuss problems, to solve various types of problems in a variety of contexts, and to develop the competence and confidence in themselves as a mathematics student.

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

The Sample Mathematics Standards of Learning Scope and Sequence should serve as a resource tool for teachers and administrators for developing effective curricula, instruction, and classroom assessment. The degree of success that students have with the Mathematics Standards of Learning will depend upon the school division's implementation of an instructional program that is aligned with the Mathematics Standards of Learning.

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topics	Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Whole Numbers: Representations & Relationships	K.1 K.2 K.3 K.4 K.5	1.1 1.2 1.3 1.4 1.5 1.7	2.1 2.2 2.3 2.5	3.1 3.2 3.3	4.1	
Whole Number Operations & Estimation: Addition and Subtraction	K.6	1.8 1.9	2.6 2.7 2.8 2.9 2.10 2.26	3.4 3.8	4.5 4.6	5.3
Whole Number Operations & Estimation: Multiplication and Division				3.4 3.9 3.10	4.7 4.8	5.3 5.5
Decimals: Representations & Relationships				3.7 3.12	4.2 4.4	5.1 5.2
Decimal Operations & Estimation: Addition and Subtraction				3.12	4.9	5.4
Decimal Operations & Estimation: Multiplication and Division						5.4 5.6
Fractions: Representations & Relationships		1.6	2.4	3.6 3.11 3.5	4.2 4.3	5.2
Fraction Operations & Estimation: Addition and Subtraction					4.9	5.7
Measurement Money	K.6 K.7	1.10	2.11	3.13		
Measurement: Length	K.8 K.10	1.12	2.12	3.14	4.11	5.11

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topics	Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Measurement: Weight/Mass	K.8 K.10	1.12 1.14	2.15	3.14	4.10	5.11
Measurement: Volume (Liquid)		1.13	2.17	3.14	4.12	5.11
Measurement: Temperature	K.8 K.10		2.19	3.17		5.11
Measurement: Time	K.8 K.9	1.11	2.16 2.18	3.15 3.16		5.12
Measurement: Perimeter, Area, Volume, Circumference			2.12 2.7 2.13 2.14		4.13	5.8 5.9 5.10 5.11
Geometry: Two-Dimensional (plane)	K.11 K.12	1.16 1.17	2.22	3.18 3.19	4.14 4.15 4.16	5.13 5.14 5.15a
Geometry: Three-Dimensional (solid)			2.22 2.20	3.18	4.17a,b	5.16
Geometry: Transformations			2.21	3.20	4.17c	5.15b,c,d, e
Geometry: Spatial Relationships	K.13	1.15			4.18	
Statistics: Collect, Organize, Display, Analyze and Interpret Data	K.14 K.15	1.18 1.19	2.23	3.21 3.22	4.20	5.18 5.19
Probability	K.16		2.24	3.23	4.19	5.17
Patterns and Functions: Representations & Relationships	K.17 K.18	1.20 1.21	2.25	3.24	4.21	5.20
Algebra: Representations & Relationships			2.26	3.25	4.22	5.21 5.22

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Whole Numbers: Representation & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: base-10 materials, place value charts
	▪ Identify and communicate, both orally and in written form, the place value for each digit in whole numbers expressed through the one millions place. ▪ Read whole numbers through the one millions place that are presented in standard format, and select the matching number in written format. ▪ Write whole numbers through the one millions place in standard format when the numbers are presented orally or in written format. ▪ Identify and use the symbols for *greater than*, *less than*, and *equal to*. ▪ Compare two whole numbers expressed through the one millions, using symbols >, <, or =. ▪ Round whole numbers expressed through the one millions place to the nearest thousand, ten thousand, and hundred-thousand place.	4.1		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Whole Number Operations & Estimation: Addition and Subtraction	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: calculators
	▪ Estimate whole-number sums and differences, using rounding, front-end strategies, and compatible number strategies. Describe the method of estimation used. ▪ Refine estimates by adjusting the final amount, using terms such as *closer to, between*, and *a little more than*.	4.5		
	▪ Determine the sum or difference of two whole numbers, each 999,999 or less, in vertical form with or without regrouping. ▪ Determine the sum or difference of two whole numbers, each 999,999 or less, in horizontal form with or without regrouping. ▪ Find the sum or difference of two whole numbers, each 999,999 or less, using paper and pencil. ▪ Find the sum or difference of two whole numbers, each 999,999 or less, using a calculator.	4.6		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Whole Number Operations & Estimation: Multiplication & Division	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: calculators
	▪ Estimate the products of two whole numbers when one factor has two digits or fewer and the other factor has three digits or fewer. ▪ Find the product of two whole numbers when one factor has two digits or fewer and the other factor has three digits or fewer, using paper and pencil and calculators.	4.7		
	▪ Estimate the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend. ▪ Find the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend.	4.8		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Decimals: Representations & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: decimal squares, base-10 materials, 10 x 10 grids, meter sticks, number lines, money (coins), base-10 place value mats/charts
	▪ Represent fractions for halves, fourths, fifths, and tenths as decimals through thousandths, using concrete objects (e.g., demonstrate the relationship between the fraction $\frac{1}{4}$ and its decimal equivalent 0.25). ▪ Relate fractions to decimals, using concrete objects (e.g., 10-by-10 grids, meter sticks, number lines, decimal squares, money [coins]).	4.2		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Decimals: Representations & Relationships (cont'd)	▪ Investigate the ten-to-one place-value relationship for decimals through thousandths, using base-10 manipulatives (e.g., place-value mats/charts, decimal squares, base-10 blocks, money). ▪ Represent and identify decimals expressed through thousandths, using base-10 manipulatives, pictorial representations, calculators, and numerical symbols (e.g., relate the appropriate drawing to 0.005). ▪ Read and write decimals expressed through thousandths, using base-10 manipulatives, drawings, calculators, and numerical symbols. Any decimal less than 1 will include a leading zero (e.g., 0.125). ▪ Round decimals to the nearest whole number, tenth, and hundredth. ▪ Compare the value of two decimals, using the symbols >, <, =.	4.4		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Decimal Operations & Estimation: Addition and Subtraction	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: decimal squares, base-10 materials, number lines, money (coins), base-10 place value mats/charts
	▪ Add and subtract with decimals through thousandths, using concrete materials, pictorial representations, and paper and pencil. ▪ Solve problems that involve adding and subtracting with decimals through thousandths.	4.9		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Fractions Representation & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: fraction circles, pattern blocks, geo-boards, color tiles, graph paper, two-sided counters, chips, Cuisenaire rods, unifix cubes, fraction strips
	▪ Identify, model, and compare fractions and mixed numbers through twelfths, using - region/area models (e.g., fraction circles, pattern blocks, geoboards, color tiles, graph paper); - set models (e.g., two-sided counters, chips); and - measurement models (e.g., cuisenaire rods, unifix cubes, fraction strips, number lines). ▪ Represent fractions for halves, fourths, fifths, and tenths as decimals through thousandths, using concrete objects (e.g., demonstrate the relationship between the fraction $\frac{1}{4}$ and its decimal equivalent 0.25). ▪ Relate fractions to decimals, using concrete objects (e.g., 10-by-10 grids, meter sticks, number lines, decimal squares, money [coins]). ▪ Identify and represent equivalent fractions through twelfths, using region/area models, set models, and measurement models.	4.2		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Fractions Representation & Relationships (cont'd)	▪ Compare two fractions having denominators of 12 or less, using manipulative models and drawings, such as - region/area models (e.g., fraction circles, pattern blocks, geoboards, color tiles, graph paper, drawings); - set models (e.g., two-sided counters, chips, drawings); and - measurement models (e.g., cuisenaire rods, unifix cubes, fraction strips, rulers/number lines, drawings). ▪ Compare two fractions with like denominators by comparing numerators (e.g., $\frac{1}{5} < \frac{3}{5}$). ▪ Compare two fractions having unlike denominators of 12 or less by comparing the fractions to common benchmarks (e.g., $\frac{1}{2}$ or 1) to determine their relationship or by finding a common denominator. ▪ Use the symbols >, <, and = to compare the numerical value of two fractions having denominators of 12 or less.	4.3		

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Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Fractions Operations & Estimation: Addition and Subtraction	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: fraction circles, pattern blocks, geo-boards, color tiles, graph paper, two-sided counters, chips, fraction bars
	▪ Add and subtract with fractions having like denominators of 12 or less, using concrete materials, pictorial representations, and paper and pencil. ▪ Add and subtract with fractions having unlike denominators of 12 or less, using concrete materials pictorial representations and paper and pencil. ▪ Solve problems that involve adding and subtracting with fractions having like and unlike denominators of 12 or less.	4.9		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Length	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: rulers, yard sticks, meter sticks
	▪ Determine an appropriate unit of measure (e.g., inch, foot, yard, millimeter, centimeter, and meter) to use when measuring everyday objects in both metric and U.S. Customary units. ▪ Estimate the length of everyday objects (e.g., books, windows, tables) in both metric and U.S. Customary units of measure. ▪ Measure the lengths of objects in both metric and U.S. Customary units, measuring to the nearest inch ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$), foot, yard, millimeter, centimeter, or meter, and record the length including the appropriate unit of measure (e.g., 24 inches). ▪ Compare estimates of the length of objects with the actual measurement of the length of objects. ▪ Identify equivalent measures of length between U.S. Customary measurements and between metric measurements.	4.11		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Length (cont'd)	▪ Estimate conversions between the U.S. Customary and metric units, using ballpark comparisons, such as - 1 inch is about 2.5 centimeters; - 1 meter is a little longer than 1 yard; - 1 mile is slightly farther than 1.5 kilometers; and - 1 kilometer is slightly farther than half a mile.	4.11		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Weight/Mass	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: balance scales, various weigh
	▪ Determine an appropriate unit of measure (e.g., ounce, pound, gram, kilogram) to use when measuring everyday objects in both metric and U.S. Customary units. ▪ Measure objects in both metric and U.S. Customary units (e.g., ounce, pound, gram, or kilogram) to the nearest appropriate measure, using a variety of measuring instruments. ▪ Record the mass of an object including the appropriate unit of measure (e.g., 24 grams). ▪ Estimate conversions between U.S. Customary and metric units, using ballpark comparisons, such as - 1 ounce is about 28 grams; - 1 nickel has the mass of about 5 grams; and - 1 kilogram is a little more than 2 pounds.	4.10		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Volume (Liquid)	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: containers that measure cup, pint, gallon, or liter
	▪ Determine an appropriate unit of measure (cups, pints, quarts, gallons, milliliters, or liters) to use when measuring liquid volume in both metric and U.S. Customary units. ▪ Estimate the liquid volume of containers in both metric and U.S. Customary units of measure to the nearest cup, pint, gallon, milliliter, or liter. ▪ Measure the liquid volume of everyday objects in both metric and U.S. Customary units, including cups, pints, quarts, gallons, milliliters, and liters, and record the volume including the appropriate unit of measure (e.g., 24 gallons). ▪ Identify equivalent measures of volume between U.S. Customary and metric measurements. ▪ Estimate conversion between U.S. Customary and metric units, using ballpark comparisons, such as 1 quart is a little less than 1 liter, and 1 liter is a little more than 1 quart.	4.12		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Measurement: Perimeter, Area, Volume, Circumference	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:** ▪ Identify and describe situations where the perimeter of an object should be found (e.g., the distance around the edge of walls of the classroom; the length of fencing needed to enclose a playground). ▪ Identify and describe situations in which the area should be found (e.g., laying tile for the floor of the classroom). ▪ Measure the perimeter of an object, using nonstandard units of measure (e.g., unsharpened pencil, board eraser, toothpick, chalk, crayon, paper clip) and record the perimeter including the nonstandard unit of measure used (e.g., 24 paper clips). ▪ Measure the perimeter of concrete objects in both metric and U.S. Customary units of measure to the nearest inch, foot, yard, millimeter, centimeter, or meter. ▪ Determine the perimeter of an object or pictorial representation of an object and label it with the appropriate standard or nonstandard unit of measure.	4.13	▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: string, measuring tapes, unsharpened pencils, board erasers, toothpicks, chalk, crayon, paper clip, rulers, geo-boards

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Two-Dimensional (plane)	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: straightedge, ruler, angle ruler, protractor ▪ DOE Geometry for Elementary Teachers Staff Development Guide
	▪ Differentiate among a point, line, line segment, and ray by using the definitions to compare. ▪ Investigate and describe the relationships between and among points, lines, line segments, and rays.	4.14		
	▪ Identify points, lines, line segments, rays, and angles, using their definitions. ▪ Draw representations of lines, line segments, rays, and angles, using a straightedge, ruler, or angle ruler.	4.15		
	▪ Identify lines that are parallel, intersecting, or perpendicular, using their definitions. ▪ Draw representations of intersecting, parallel, and perpendicular lines.	4.16		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Three Dimensional (solid)	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: solid geometric figures-sphere, cube, rectangular, solid ▪ DOE Geometry for Elementary Teachers Staff Development Guide
	▪ Identify and describe the properties of squares, rectangles, triangles, parallelograms, rhombi, and circles. ▪ Identify and describe the properties of spheres, cubes, and rectangular solids (prisms). ▪ Identify congruent and noncongruent figures. ▪ Analyze and compare the properties of - circles and spheres; - squares and cubes; and - rectangles and rectangular solids (prisms).	4.17a, b		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Transformation	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: tracing paper, mirrors, Miras, sets of paper and plastic triangles and quadrilaterals ▪ DOE Geometry for Elementary Teachers Staff Development Guide
	▪ Recognize the congruence of plane figures resulting from geometric transformations such as translation, reflection, and rotation.	4.17c		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Geometry: Spatial Relationship	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: graph paper ▪ DOE Geometry for Elementary Teachers Staff Development Guide
	▪ Identify the ordered pair for a point in the first quadrant of a coordinate plane, given the coordinates (x, y). ▪ Locate points in the first quadrant on a coordinate grid, given the coordinates (x, y).	4.18		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Statistics	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: graph paper ▪ DOE Probability and Statistics for Elementary Teachers Staff Development Guide
	▪ Collect data, using, for example, observations, measurement, surveys, scientific experiments, polls, or questionnaires. ▪ Organize data into a chart or table. ▪ Construct and display data in bar graphs, labeling one axis with equal whole-number increments of 1 or more (numerical data) (e.g., multiples of 5, 10, or 100) and the other axis with categories related to the title of the graph (categorical data) (e.g., swimming, fishing, boating, and water skiing as the categories of "Favorite Summer Sports"). ▪ Construct and display data in line graphs, labeling the vertical axis with equal whole-number increments of 1 or more and the horizontal axis with continuous data commonly related to time (e.g., hours, days, months, years, and age). Line graphs will have no more than four identified points along a continuum for continuous data. For example, growth charts showing age versus height place age on the horizontal axis (e.g., 1 month, 2 months, 3 months, and 4 months). ▪ Title the given graph or identify the title in a given graph and label the axes.	4.20		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Statistics (cont'd)	▪ Analyze information from simple line and bar graphs by describing the characteristics of the data and the data as a whole (e.g., the category with the greatest/least, categories with the same number of responses, similarities and differences, the total number). Data points will be limited to 20 and categories to 4. ▪ Interpret the data to answer the question posed, and compare the answer to the prediction (e.g., "The summer sport preferred by most is swimming, which is what I predicted before collecting the data."). ▪ Write at least one sentence to describe the analysis and interpretation of the data, identifying parts of the data that have special characteristics, including categories with the greatest, the least, or the same. ▪ Select from among four choices a correct analysis of the data presented in a bar or line graph. For example, given a line graph showing the number of soccer players (in millions) in the U.S. over the time period 1980 to 2000 in five-year intervals, select the correct answer response that relates to the graphs, such as, "The greatest increase in number of soccer players occurred between 1985 and 1990."	4.20		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Probability	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: spinners, number cubes, two-color counters, coins, colored tiles ▪ DOE Probability and Statistics Staff Development Guide
	▪ Model and determine all possible outcomes of a given simple event where there are no more than 12 possible outcomes, using a variety of manipulatives, such as coins, number cubes, and spinners. ▪ Conduct experiments to determine the probability of an event occurring for a given number of trials (no more than 12 trials), using manipulatives (e.g., the number of times "heads" occurs when flipping a coin 10 times; the chance that when the names of 12 classmates are put in a shoebox, a name that begins with *D* will be drawn). ▪ Write the probability of a given simple event as a fraction, where the total number of possible outcomes is 12 or fewer. ▪ Identify the likelihood of an event occurring and relate it to its fractional representation (e.g., impossible/0; equally likely/$\frac{1}{2}$; certain/1).	4.19		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Patterns and Functions: Representations & Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: attribute blocks, pattern block, colored cubes and tiles, linking cubes, calculator ▪ DOE Patterns, Functions, and Algebra Staff Development Guide
	▪ Describe geometric and numerical patterns, using tables, symbols, or words. ▪ Create geometric and numerical patterns, using concrete materials, number lines, tables, and words. ▪ Extend geometric and numerical patterns, using concrete materials, number lines, tables, and words.	4.21		

Grade 4 Mathematics Standards of Learning Sample Scope and Sequence

Organizing Topic	Essential Knowledge and Skills	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Algebra: Representations and Relationships	**The student will use problem solving, mathematical communication, mathematical reasoning, connections and representations to:**		▪ Classroom Observations ▪ Teacher Interviews ▪ Student Demonstrations ▪ Quizzes and Tests	▪ Manipulatives: color tiles ▪ DOE Patterns, Functions, and Algebra Staff Development Guide
	▪ Recognize that the equals sign (=) relates equivalent quantities. ▪ Write number sentences to represent equivalent mathematical relationships (e.g., $4 \times 3 = 2 \times 6$). ▪ Identify number sentences that show appropriate use of the equals sign.	4.22		